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The Housing Industry:
Perspective and Prospective

Working Paper Four
The Housing Industry and Change

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The Housing Industry:
Perspective and Prospective

Working Paper Four
The Housing Industry and Change

Prepared by Clayton Research Associates
and Scanada Consultants

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INTRODUCTION

Change is unavoidable; it is a fact of life. Change results in ideas, improved methods of production and new products. It is the essence of a vibrant economy. Without change, there is stagnation or decay, and economic progress is severely hampered. For some, change is seen as a threat to a comfortable status quo and should therefore be resisted. For others, change is a challenge, the key to prosperity and self-gratification. These are the entrepreneurs: those who pursue an idea to produce goods or services less expensively, alter a current good or service or introduce a new one for profit.

Most people, including producers of housing, have little or no control over much of the change influencing their lives. Change is externally generated through changing economic conditions, changing demographics, changing lifestyles, changing government policies or changing competition from other countries. The key to determining the impact of change is how people respond to it—whether they look on change as a challenge, are indifferent or actively resist change.

All change, of course, is not necessarily an improvement. For our purposes, change is desirable either if it satisfies consumer demands better than existing goods or services or if it results in goods or services being produced at a lower per unit cost.

THE HOUSING INDUSTRY AND CHANGE

The housing industry is often perceived as backward, unwilling to try new ideas or technologies and whose product has changed little over many decades. To illustrate this backwardness, its failure to adopt large-scale factory assembly line techniques is often raised.

If the housing industry is backward and unresponsive to change, this has widespread implications: Either the industry is using obsolete management and production methods, resulting in higher housing costs than need be; or it is not producing what consumers really want.

Presumably, backwardness in the housing industry would have to be the result of one or more of the following factors:

- Few entrepreneurs exist among the people active in the housing industry.

Possibly, owners and managers of housing firms are satisfied with the status quo. Since housing is a necessity, perhaps builders may feel that any costs associated with outdated construction methods can be passed on to the consumer and therefore have less incentive to improve efficiency. For similar reasons, builders may not make a rigorous effort to discover consumer preferences.

- Indigenous characteristics of the housing industry inhibit desirable change.

It could be the housing industry has a number of characteristics that effectively inhibit the introduction of more efficient production techniques or result in an extended time lag between a change in consumer demand and a resultant change in the new housing product. Characteristics distinguishing the housing industry from most other goods-producing industries include a geographically dispersed market, a heterogeneous consumer demand, a basically immobile product combined with high transportation costs, dissimilar local regulations and a high susceptibility to cyclical instability.

- Institutional constraints restrain desirable change.

Institutional constraints include possible restrictions imposed on labour productivity through the collective bargaining process, as well as government regulatory involvement in the housing marketplace (for example, building codes and land use controls). These might slow the introduction of new production techniques and building materials or inhibit the industry's ability to respond to changes in consumer demand.

The extent to which the housing industry may be backward — does not readily adopt change — and the extent to which the above three factors may cause this backwardness is the subject of this working paper.

SCOPE OF THE PAPER

The manner in which the single-family homebuilding industry responds to change is explored. It begins with a structured but generalized discussion of change: why change is generally desirable, the sources of change, how change gains general acceptance, factors affecting the speed with which new ideas gain general acceptance and the role of government as an agent of change.

The characteristics of the single-family homebuilding industry are then related to the generalized framework for change. The discussion is limited to the single-family homebuilding industry owing to the larger literature base available for this component of the housing industry and the merits of providing more detailed insight into one segment of the industry rather than a superficial examination of all sectors.

Selected case studies of change in the single-family homebuilding industry focusing on the industry's response to change and the broader implications of this response are also presented.

STRUCTURE OF THE PAPER

This working paper comprises the following five chapters:

- Chapter One discusses in general the process of change, including its definition, sources and the nature of its diffusion;
- Chapter Two examines the process of change in the single-family homebuilding sector;
- Chapter Three presents a case study of the adoption of roof trusses by the single-family homebuilding industry to illustrate the industry's response to technical change;
- Chapter Four presents case studies of the single-family homebuilding industry's response to sharp variations in demand to illustrate how the industry responds to unexpected changes in its market environment; and
- Chapter Five presents the conclusions.

Footnotes referenced in each chapter are consolidated at the end of the main text.

CHAPTER ONE
THE PROCESS OF CHANGE

THE DEFINITION OF CHANGE

According to the Concise Oxford Dictionary, change refers to "making or becoming different."[1] Change can thus be positive or negative. Negative change can cause the demise of firms resulting in loss of jobs, incomes and tax revenues and higher government costs through the payment of unemployment benefits. On the other hand, much change is positive. For example, it is a precondition for technical advance (broadly defined), identified by the Economic Council of Canada as a major source of economic growth in modern times.[2]

To avoid confusion with the more restrictive concept that is commonly used, what the Economic Council of Canada calls "technical advance" is referred to in this paper as "positive change." For simplicity, positive change is referred to as "change."

The Economic Council of Canada defines technical advance broadly as "the introduction of new ideas, processes and products or of improvements to existing practices, processes and products."[3] Some examples from the past 100 years illustrate the breadth of the concept of technical advance as interpreted by the Economic Council, which is much broader than what economists have traditionally referred to as technological change.[4] Computer programming of machine tools, the rise of the supermarket, fast-food chains and self-serve gas stations and the use of Ensolite insulation during cold-weather house construction are examples of new ideas or processes. Examples of new products include the automobile, telephone, pneumatic wrenches and Scotch tape. "Soft" technologies (for example, just-in-time inventory management) and new human resource practices (for example, quality circles) are examples of new practices.

The key elements of positive change are that they "contribute to the production of more or better goods and services without requiring more labour, capital or materials. For any given level of effort, they lead to improved living standards."[5]

THE BENEFIT AND CHALLENGES OF CHANGE

The benefit of change appears to be clear: improved living standards for Canadians. However, the Economic Council of Canada vividly outlines both the challenges of change and the consequences if Canada does not rapidly adopt change.[6]

The Economic Council asserts that Canadians must openly embrace change; failure to do so will entail a loss of prosperity and jobs. It proposes a "twin pillar" national commitment to change: The first is the rapid adoption of changes; the second is to ensure the labour force is capable of adjusting fully and rapidly to change.

The basis for these proposals is what the Council refers to as "some uncomfortable facts:"[7]

- Canada's industry continues to lag behind those of other countries in adopting changes essential to future prosperity;
- Change is never smooth and balanced: It creates both winners and losers; and
- The pace of change in the global economy will remain rapid and may even accelerate.

THE ELEMENTS OF CHANGE

Change has two components. First, a new or improved idea, process or product has to be developed; second, it has to spread to all firms in the industry that will eventually use it (the so-called diffusion process).

Sources of Change

The Economic Council of Canada distinguishes between two domestic sources of change as follows:[8]

- Applied research and development—the systematic search for new or improved ideas, processes or products; and

- *En passant* discoveries—discoveries occuring as a by-product of the normal processes of production and marketing.

A third source of change identified by the Economic Council is the adoption by a Canadian firm of an idea, process or product already in use abroad.

In a recent book, *Innovation and Entrepreneurship*, where Peter Drucker details the sources of domestic change,[9] a distinction is made between two major sources of change: internal and external. While internal sources of change are those generated within a company or industry, external sources are those generated outside the firm or industry but with which the firm or industry has some contact.

The several types of internal change are as follows:

- Unexpected Occurrences: Many new opportunities arise from changes in consumer demand, which industry does not fully recognize, or from mismatches between new products and target markets. One example provided by Drucker is IBM's attempt in the early 1930s to target the first modern accounting machines to banks. The banking industry was uninterested at the time, but it was public libraries, an unintended customer, that proved to be the best customers for the machines.

- Incongruities: Changes also arise as solutions to fairly straightforward problems. An example provided by Drucker involves the development of container ships. In an attempt to solve the problem of declining profits, shipping companies wrongly tried to make ships faster and more fuel-efficient. Once it was realized that the real costs were a result of ships sitting idle in ports while loading or unloading, the shipping companies developed the container ship using technology that had been applied in the trucking industry for 30 years.

- Process Need: This source of change arises from a problem inherent in existing methods of producing goods or services. One of Drucker's examples is the introduction of automatic switchboards by AT&T in the U.S. in the early 1900s. An analysis of the future volume of telephone calls and characteristics of the U.S. population brought the realization that by 1920 the number of telephone calls would exceed the availability of manual switchboard operators, even if every single female in the U.S. worked as an operator. Within two years AT&T had developed and installed the automatic switchboard.

- Industry and Market Changes: New opportunities arise when either industry or market structures change for a variety of reasons, including changing consumer demands or rapid growth. Seldom do leaders in an industry before a structural change remain leaders. An example is the emergence in the United States of independent health care clinics and health maintenance offices.

External sources of change include changes in demographics and perceptions and new knowledge:

- Demographics: Demographics is the most predictable external source of change, largely because of long lead times. One example of change in response to demographics provided by Drucker is the development of robotics in Japan. In the early 1970s, developed countries knew well that the combination of the baby bust and the education explosion likely would reduce the number of people available for traditional blue collar work by 1990. As only the Japanese acted, they were able to capture a 10-year lead in robotics development.

- Changes in Perception: Perceptual changes of a given body of facts can be a source of change. One of Drucker's examples is the fitness craze that has swept the United States at a time when medical science has ensured a longer life expectancy than ever before. However, instead of enjoying the advances of health, Americans appear to be concentrating on how far they have yet to go to gain immortality. This example illustrates how the public's response to a given body of facts has changed.

- New Knowledge: Generally, changes arising from new knowledge are less predictable and have longer lead times than changes arising from other sources. Also, it is generally the case that changes arising from new knowledge require more than one "strand" of new knowledge. This is illustrated in Drucker's example of the development of the

computer (at least six strands of new knowledge, including the development of binary arithmetic, punch cards and symbolic logic, were required), which took 28 years to develop even after all the required new knowledge was available.

The work of the Economic Council and Drucker illustrate that the impetus for change arises from several sources. What is required is a perceptive person or firm to recognize the potential for change and pursue the opportunities.

Diffusion of Change

Once one firm in an industry adopts a new or improved idea, process or product, considerable time can elapse before the change is adopted throughout an industry. For example, the Economic Council estimates that the widespread use of roof trusses throughout Canada took over 10 years.[10]

The speed of diffusion appears to be related to factors affecting the expected profitability and risk associated with the change. A number of variables have been hypothesized: size of the firm; degree of competition in the industry; size of the potential market; access to risk capital; and age, education and other characteristics of the firm's management.[11] The patent system also can affect the speed with which new processes or products are spread through an industry.[12]

CHARACTERISTICS OF FIRMS AND INDUSTRIES RECEPTIVE TO CHANGE

A 1983 Economic Council of Canada study, *The Bottom Line*, describes the determinants of change at both the firm and industry levels within the Canadian context.[13] Theories relating to the determinants of applied research and development (R&D) expenditures are reviewed.

At the level of the firm, the following four variables are mentioned:

- The size of the firm: There may be some minimal size before R&D is undertaken, and R&D may become more efficient as firms become larger;
- Product diversification: R&D in a specific area may be less risky for a multi-product firm than for a specialized firm;
- The nationality of firms: It is sometimes argued that foreign-controlled firms do less R&D in Canada than Canadian-owned firms; and
- Availability of risk capital: It is often argued that only firms generating a substantial cash flow can support a sizable R&D effort since many firms are unwilling or unable to borrow substantial funds for this purpose.

At the industry level, the following four variables have been suggested:

- The level of technological opportunity: Industries with greater scope for exploiting scientific knowledge undertake more R&D. For example, it is thought the chemical industry has greater potential for technical discovery than the personal service sector;
- Degree of industry concentration: Industries with one or more firms may have less incentive to adopt change than those with more competition; conversely, too many firms could inhibit change since firms making the discoveries may be unable to recover their development costs if other firms quickly imitate the n;
- Expected size of market: The market must be sufficient to have the costs of discovering and introducing a change spread over a large volume of output; and
- The regulatory climate: Resources may be diverted to cope with regulation; moreover, unresponsive regulation can stunt the process of change.

A literature review by the Economic Council did not yield unambiguous answers to most of the above hypotheses, with the Council concluding that larger markets provide more incentives for firms to engage in R&D activities than do smaller markets. The Economic Council also concluded that, in general, incentives to introduce change are greater under competition than under a monopoly if the firms undertaking the change can retain the financial advantage.

The Economic Council study also examined the variables affecting the rate of diffusion of a change throughout an industry. An important determinant

appears to be industry structure. The presence of many small firms tends to slow the diffusion process because of difficulties in obtaining and making use of
information.

ROLE OF GOVERNMENT

According to the Economic Council, situations exist where government has a role in encouraging change and the diffusion of change.

Indeed, there may be a case for government-managed research and development "in any industry that is characterized by a large number of small firms and by difficulty in patenting or protecting discoveries."[14] This is because industries with these characteristics are unlikely to undertake R&D because prospective private returns are inadequate. However, if developed with the help of subsidies, some changes can generate social returns in excess of subsidy and private-sector costs combined.

With regard to diffusion, the following possible reasons for government involvement exist:

- Information on the existence of new products or processes may be too costly for firms to discover as rapidly as is socially desirable;
- Even though an innovation may already be in use, the risks in adopting it somewhere else may deter private entrepreneurs from adopting it as rapidly as is socially desirable;
- Considerable evidence indicates a large gap exists between average and best practice in many industries; and
- New technology does not appear to spread at the most desirable speed among Canada's regions.

The Economic Council concluded:

> In sum, while a cast-iron argument cannot be made against the view that the market will function perfectly in diffusing new technology, the case for some government involvement and assistance in the process seems moderately strong.[15]

The Economic Council also stated that government has an important role in ensuring that knowledge relating to new or improved ideas, products and processes developed in other countries is made available to Canadian firms and industries.

SYNOPSIS

This general discussion is drawn largely from the work of the Economic Council of Canada, supplemented by work by Peter Drucker. The Economic Council defines change as more than technological change. Change is positive if it results either in new or improved goods or services that satisfy consumer demands better than existing goods or services or in goods or services being produced at a lower per unit cost.

Change can occur through the results of applied research and development, through discoveries made as a result of the ongoing operations of firms and through the importation of ideas, processes and products from other countries. Industries differ in their receptiveness to change and the rate at which change is adopted throughout the industry (diffusion). The origins of change can come from within (internal change) or from without (external change).

Under specific circumstances government has a role to encourage both the adoption and diffusion of desirable change.

CHAPTER TWO
THE SINGLE-FAMILY HOMEBUILDING INDUSTRY AND CHANGE

THE SINGLE-FAMILY HOMEBUILDING INDUSTRY'S RESPONSIVENESS TO CHANGE

The preceding discussion suggests the following conclusions about a given industry's responsiveness to desirable change:

- The more an industry is dominated by small firms, the less likely its members will search for and adopt changes enhancing their efficiency or improving or expanding their line of products, and the slower the diffusion of both domestically generated and imported change to most firms in the industry;

- The more evolutionary than revolutionary the changes, thus making them easier to copy and difficult to patent, the less likely member firms will search for and adopt change;

- The smaller the potential size of the market, the less likely member firms will search for and adopt change; and

- The more the activities of an industry are subjected to government regulation, the less likely industry will search for and adopt change.

The characteristics of the single-family homebuilding industry suggest a comparatively low rate of responsiveness to and acceptance of change. This conclusion follows from a comparison of the characteristics of single-family homebuilding firms with the characteristics of firms that readily develop and adopt change.

- The single-family homebuilding industry is composed of a multitude of small firms, a much smaller number of medium-sized firms and only a few large firms building more than 100 houses per year. However, most of the large builders are still small compared to average-sized firms in most goods-producing industries.

This industry structure suggests that, as a group, builders likely are more reluctant to search for and adopt new or improved ideas, processes or products than firms in many other industries and that the single-family homebuilding industry has a fairly sluggish diffusion rate for changes once they are introduced by one or a few firms.

- Most changes in the single-family homebuilding production processes and product are evolutionary in nature.

Both strictly technological advances (that is, changes increasing productivity in the construction of a specific housing product) and changes in response to changing market opportunities (that is, a swing in preferences to more elaborate kitchens and bathrooms, and more openness in internal design) tend to be evolutionary rather than revolutionary in nature. This characteristic inhibits the willingness of builders to search actively for changes since the changes typically cannot be patented and can easily be copied.

- The new single-family housing market is fragmented.

The demand for new single-family homes is geographically dispersed. Also, demand is heterogeneous since comparatively few buyers are willing to buy the exact same house. Moreover, fragmented demand, a housing structure that is tied to a specific site and the bulkiness of a factory-built structure, which makes it costly to transport, mean that builders cannot generally employ large-scale production techniques.

The effective limited size of the market reinforces the predominance of small firms, thus retarding the introduction and adoption of change in the single-family homebuilding industry.

- The single-family homebuilding industry is heavily regulated in two ways.

The construction of the house is regulated closely by building codes. Most provinces have building codes,

which are modelled on the National Building Code and administered by municipal officials. In addition, the size of the lot on which the house is to be located, the shape, external appearance and positioning of the house on the lot, the servicing and the neighbourhood amenity package are regulated to a considerable extent by municipalities. A builder must apply for municipal approval if changes to the original specifications are desired for the house or lot.

These regulations inhibit the introduction and adoption of change within the industry.

ROLE FOR GOVERNMENT

The Economic Council stated that under certain circumstances government does have a role in promoting research that can lead to the introduction and widespread adoption of change. This statement appears to be true for the development of technology for constructing new single-family houses. Government assistance can take the form of direct research or financial aid to the private-sector industry associations (for example, Canadian Home Builders' Association and Association provinciale des constructeurs d'habitations du Québec).

Governments can also promote change by monitoring and assessing the applicability of foreign developments to Canada and ensuring this information is available to the single-family homebuilding industry. Finally, governments can ensure the regulatory environment, in particular, building and land use regulations, does not unnecessarily hinder desirable changes in the industry.

TECHNOLOGICAL VERSUS MARKET-INDUCED INTERNAL CHANGE

The generalized theory of change to the single-family homebuilding industry appears to provide an analytical foundation for the findings of Working Paper Two concerning the production process of this sector of the housing industry. Conversely, it appears inconsistent with the findings of Working Paper One concerning the structure of the industry.

The single-family homebuilding industry's methods of production have changed over the postwar period, but for the most part these changes were evolutionary. (See Working Paper Two.) Production changes remained evolutionary in nature even though the expectation of the 1940s, and at various times since, that factory-built housing would become commonplace never materialized. The great majority of changes in the production process were found to have originated outside the homebuilding industry from the research and development efforts of the manufacturers of building materials or equipment, with much of this activity occurring in the United States. The working paper also found that builders tended to be slow in adopting innovations. The findings are consistent with the generalized theory of change, which suggests the characteristics of the single-family homebuilding industry are such that this industry will have a comparatively low rate of responsiveness and acceptance of change.

Contrastingly, the single-family homebuilding industry was found to have a high capacity for adjusting to the changing marketplace. (See Working Paper One.) This finding relates primarily to the industry's ability to expand the number of homebuilding firms, with a shift to larger firms, during times of increasing demand and to decrease the number and size of firms when demand declines. This ability to shift the number and composition of single-family homebuilding firms results from the inherent characteristics of the industry combined with relatively low barriers to entry.

Numerous changes have occurred in both the production process and the structure of the single-family homebuilding industry, particularly the former, over the postwar period, as illustrated in Working Papers One and Two. Two case studies have been selected to explore the nature of change in this sector of the housing industry: The development and adoption of roof trusses illustrate technological change; the response of the single-family homebuilding industry to two pronounced shifts of demand, the downturn in demand for new housing throughout the country in 1981–82 and the upsurge in demand in Ontario during the 1985–early 1987 period, illustrate market-induced internal change.

APPLICABILITY OF THE FINDINGS TO THE OTHER THREE SECTORS OF THE HOUSING INDUSTRY

That the single-family homebuilding industry is not overly responsive to technological change and that there is a role for government to encourage the search for, adoption and diffusion of change in this industry are applicable, to varying degrees, to other sectors of the housing industry.

However, it is likely these findings apply more to the residential renovation industry since the average firm size is smaller and the extent of market fragmentation is greater than for the single-family homebuilding industry. They are probably less applicable to the apartment and residential land development sectors since the average firm size is larger than for single-family builders, though market fragmentation and close regulation are also features of the land development industry.

CHAPTER THREE
ROOF TRUSSES—A CASE STUDY OF TECHNOLOGICAL CHANGE IN THE SINGLE-FAMILY HOMEBUILDING INDUSTRY

Frequently, the single-family homebuilding industry is perceived as technologically backward since most houses are built on-site rather than in factories with the latest assembly-line and computer technology. While the typical single-family house has changed little in appearance, structure or functional performance over the postwar period, construction techniques for single-family houses have not stagnated. However, the change has been evolutionary. The use of prefinished materials, sheet materials and power tools on-site have occurred in response to rising real wage rates in the construction industry and the continued search for increased profitability. The use of roof trusses, waferboard or plywood and prefabricated windows, cabinetry and chimneys have been introduced in the postwar period. As a result, the amount of on-site labour required to build a typical house has been reduced significantly.

The process whereby the engineered lightweight wood roof truss (hereafter referred to as the roof truss) was developed, initially adopted and eventually used universally is examined here to illustrate key features of the process and implications of technological change in the single-family homebuilding industry.[1]

TRADITIONAL ROOF FRAMING (JOISTS AND RAFTERS)

Before the introduction of roof trusses, the traditional practice for constructing pitched roofs for wood framed houses was to support the ceiling on a series of horizontal members (or ceiling joists) and the roof deck (and roofing) on separate sloping members (rafters). The ceiling joists were supported at one end by the exterior walls and on the other by interior load-bearing partitions. These were usually 51 mm by 152 mm (2 inches by 6 inches) members spaced from 305 mm by 406 mm (12 to 16 inches) apart. The rafters were also usually 51 mm by 152 mm members supported on the outside walls on one end and mutually supported by each other at the peak. A horizontal "collar tie" of 25 mm by 152 mm (1 inch by 6 inches) or 51 mm by 102 mm (2 inches by 4 inches) material fastened opposing rafters together near the mid span. Rafters were nailed to joists over the outside walls, and joists were nailed to each other when they lapped over interior load-bearing partitions. The ceiling joists, together with the collar ties, were intended to prevent the rafters from spreading under snow loads. The lumber was laid out and erected by skilled carpenters.

Simple in concept, the system was well known to carpenters of the day. Its relative extravagance in the use of both material and labour did not appear to be of concern in prewar Cananda in light of the abundant supply of lumber and labour.

PRESSURE FOR GREATER PRODUCTIVITY—THE ROOTS OF CHANGE

However, wartime demands created pressures on both labour and material resources and were responsible for ushering in the postwar surge in technological change that improved the use of labour and materials throughout the economy, including the single-family homebuilding industry. The labour and material shortages caused by wartime conditions awakened the housing industry to the need for greater efficiency to meet the wartime and widely anticipated increasing postwar requirements for new housing.

EARLY BEGINNINGS OF LIGHT-WEIGHT ROOF TRUSSES IN EUROPE

It is not easy to derive a definite time and place for the exact origin of roof trusses since their development was evolutionary to a large extent. Timber trusses of one kind or another have existed for hundreds of years. Their initial development was greatly influenced by the methods that were available to fasten members together. This permitted the stresses produced in one member to be transferred to another. Earliest trusses incorporated wooden pegs and complex joinery to accomplish this. Later, cast iron or steel bolts were used.

However, these systems were not efficient, and excessive timber cross-sections had to be removed for the holes that had to be drilled to accommodate the large number of bolts required to transfer stresses. The inherent inefficiency of such trusses caused the replacement of wood trusses by the more efficient steel trusses, particularly for larger spans.

A number of the more modern timber connector systems had their origin in Europe following the First World War. The war had depleted metal reserves, and wood was viewed as a partial solution to economize in the construction of buildings. The inefficiency of bolted fasteners drew attention to methods used for improving the jointing deficiency. As a result, a variety of metal devices—including split rings, shear plates, cast iron spike grids and punched metal plates—were developed that were the forerunners of the shear-developing connectors used in modern roof trusses. Most of these were placed between adjacent timbers and relied on bolts to hold the members together to develop the shear potential of the devices. However, these were of a much heavier gauge than the modern punched metal plates, which are pressed into the exterior of the joists.

U.S. GOVERNMENT AND LUMBER INDUSTRY ASSOCIATIONS RESEARCHED TRUSSES IN 1930s

In 1933, the National Committee on Wood Utilization of the U.S. Department of Commerce introduced the use of metal devices for trusses after the U.S. Forest Products Laboratory conducted extensive domestic research on their engineering properties. Shortly after, the lumber industry established the Timber Engineering Company, and through it, the TECO timber connectors were made available to the American housing industry.

The best-known connector for lightweight trusses was the "split ring," which was placed in a circular groove between two members held together by bolts. The relatively large area of the split ring made it possible to transfer fairly large stresses from one member to another much more efficiently than by bolts alone.

Split ring trusses were used in houses built in the U.S. during the Second World War, while engineered designs for house trusses were developed and published for general use there in the early 1940s.

Other fastening systems were also being developed. The Independent Nail and Packing Company, for example, sponsored considerable work at the Virginia Polytechnic Institute in Blacksberg on lightweight wood trusses with nailed joints. Standard designs for a variety of nail-connected trusses were published and distributed by the *Practical Builder* trade magazine in the early 1950s. The Small Homes Council at the University of Illinois also undertook developmental work in lightweight trusses and published standard designs for builder use. The initial designs incorporated split ring connectors and, later, glued and nailed plywood connector plates. Much of this latter work was undertaken co-operatively with Purdue University, which was also involved extensively in test and analysis programs of roof trusses.

The U.S. Forest Products Laboratory, which had been involved in the testing of the split ring connectors, also extensively tested nailed truss designs as part of a government mandate to serve the lumber industry in the economical use of wood.

TRUSSES WERE SHOWN TO PRODUCE SIGNIFICANT COST SAVINGS

The economic potential of wood roof truss designs became apparent quickly. The truss design developed during the 1940s and 1950s indicated a potential reduction in the use of lumber of 50 percent or more owing to the smaller member size and wider spacing that was now possible with the trussed configurations.

Additional savings in partition framing were achieved since these did not need to be designed to carry any loads. Buildings could also be enclosed much more quickly, making them less vulnerable to the weather during construction. Although trusses with split ring, nailed and glue-nailed connectors began to be used more and more, the introduction of contemporary metal connector plates with punched metal teeth created greater potentials for factory mechanization and spurred the widespread use of roof trusses.

THE BREAKTHROUGH—METAL TRUSS PLATES DEVELOPED BY U.S. MANUFACTURERS

"Cri-P-late," developed by Carol Sanford, was the earliest version of the modern metal plate connector. Introduced in 1953, this plate had a series of short triangular teeth that helped to transfer the load from one member to another. However, substantial nailing was required to fasten them in place. Nevertheless, because of the substantially reduced number of nails required, the popularity of the Sanford system grew rapidly.

In 1955, a metal connector plate system, called the "Gang-Nail" plate, needing no additional nailing was developed by J. Calvin Jureit. Made with heavier gauge metal than the Sanford plate, this plate was designed with long, slender teeth intended to be pressed into the wood with a hydraulic press.

The popularity of the two systems focused considerable attention on metal truss plates, and a rash of new metal plates were soon introduced. These new plates offered a variety of tooth shapes and orientations, but most were essentially adaptations of the Sanford and "Gang-Nail" systems.

Other companies involved in the early development of truss plates included Hydro-Air Engineering, Penhurst Machine Co., Truss-O-Matic, Anchor Lock, Gismo Gussets, Templin Associates, Anchor Lock and Truss Connectors of America. Most truss plate manufacturers also provided engineering design services, which greatly aided their introduction to the housing market. Potential truss fabricators had only to build the appropriate factory facilities, and the truss plate manufacturers would supply the plates as well as the truss designs (and in some cases assembly machinery). The number of truss plate manufacturers grew very rapidly, and by 1961, a U.S. association was formed to develop a uniform approach for the design criteria and production methodology for metal plate trusses. (The Canadian counterpart, the Truss Plate Institute, was formed in 1972.)

EARLY U.S. TRUSS DESIGNS USED IN CANADA

The published truss designs developed and published in the U.S. during the 1940s and 1950s found their way into Canada through various routes, such as trade publications and attendance by Canadian builders at U.S. builder conventions. They stimulated considerable early interest among Canadian homebuilders. However, builders attempting to use the U.S. designs faced several obstacles, the most formidable proving to be conservative snow load design requirements specified by many municipalities. In addition, Canadian lumber design requirements were different from U.S. requirements. Finally, in 1954, CMHC's Building Standards required roof trusses to be of a design acceptable to CMHC, which in effect required roof trusses to be designed by conventional engineering methods that generally resulted in uneconomical trusses.

Information establishing which builder was the first to introduce lightweight roof trusses into Canada is insufficient. Johnson-Crooks Construction Corporation of Kitimat and Prefabricated Buildings Limited of Saskatoon were among the first to submit designs for CMHC acceptance in 1954. There was little basis for evaluating such designs in Canada at the time other than by standard engineering analyses using locally specified design loads. Designs produced in this manner, however, were excessively massive—using 51 mm by 152 mm (2 inches by 6 inches) and 51 mm by 203 mm (2 inches by 8 inches) chord members—and expensive to build because of the conservative nature of conventional timber engineering procedures. However, truss designs produced in the U.S. generally were constructed with 51 mm by 102 mm (2 inches by 4 inches) members and spaced about two feet apart. Canadian designs in the early 1950s were, therefore, not able to compete with traditional joist and rafter construction.

NRC AND CMHC BEGAN EVALUATING TRUSS SYSTEMS

It was obvious to most engineers that conventional joist and rafter construction was much weaker than engineered trusses; yet conventional construction appeared to perform well. Press accounts from the early postwar period show that surprisingly few conventional house roofs collapsed from snow loads, which led to a suspicion that engineered truss designs were too conservative.

In the mid-1950s, the National Research Council's Division of Building Research (now the Institute for Research in Construction) undertook a field survey to determine specific types of conventional joist and rafter

constructions in use then. Representative assemblies of these were tested for their true strength. Not surprisingly, these tests revealed a wide range of failure loads, all much lower than those for engineered wood trusses. Staff of the National Research Council (NRC), who were also involved in assisting CMHC to evaluate the many truss designs being submitted, initiated the work with the objective of providing benchmark strength values against which roof truss systems could be compared. This was a novel approach, intended to address the problem of excessive conservatism of conventional engineering.

An ad hoc committee initiated by CMHC and consisting of experts from NRC, CMHC and the Canadian Forest Products Laboratory (now Forintek Canada Corporation) examined these test results to determine if they could provide a basis for an alternative approach to evaluating truss designs for Canadian use. It was agreed that roof trusses need not be stronger than acceptable types of traditional joist and rafter constructions. Accordingly, performance criteria were agreed on for roof trusses after comparing the performance of the strongest types of traditional constructions. When related to the then specified snow loads, it was agreed that roof trusses had to be capable of carrying at least twice the design snow load for a least 24 hours without collapsing and not deflect more than 1/360 of the span when supporting the design snow load and ceiling load for one hour. These criteria were adopted by CMHC for the evaluation of all new truss designs in 1956. The criteria were brought into building regulations via the Housing Standards published by NRC in 1962 and are reflected in the current issue of the National Building Code (but adjusted for revised snow loads).

Truss manufacturers now had a choice: to apply conventional engineering analysis, as previously allowed, or to demonstrate compliance through tests. The new criteria proved successful, and many tests were soon carried out to demonstrate truss performance. More efficient than traditional constructions in the use of wood, new designs were quickly adopted by the building industry. In a typical small house, over 1.8 m^3 (1,000 board feet) of lumber could be saved by using the new trusses. To reduce the need for the vast number of loading tests that followed, CMHC published a series of nailed plywood truss designs in their *Builders' Bulletin Series* in 1958. The designs, based on tests by NRC and the Canadian Forest Products Laboratory (FPL), were extremely popular with builders. The need to have each new truss design tested was viewed by some truss manufacturers as a deterrent to development and marketing; however, it is now clear this load testing significantly aided in the acceptance of the new trusses.

THE INVOLVEMENT OF NRC AND CMHC WAS POSITIVE

Shortly after metal truss plates were introduced in the U.S. in the 1950s, plate manufacturers began to market their systems in Canada. Therefore, many of the first truss plates used in Canada closely followed the introduction of their American counterparts. During the late 1950s, many such systems were introduced into Canada. Although the Canadian market was difficult to penetrate initially because of the conservative nature of engineered design, to some extent, it proved easier to gain truss acceptance in Canada than in the U.S. because of CMHC's new performance criteria.

USE OF TRUSSES ACCELERATED IN THE 1960s

The acceptance and popularity of the lightweight wood roof truss among builders in Canada developed in stages. Although metal truss plates were used in Canada in the late 1950s, the initial introduction of pre-assembled trusses was slow due to conservative engineering procedures. Although there was isolated use of what could be termed "lightweight" trusses during the early 1950s, it was only after the adoption of performance criteria in 1956 that truss applications greatly expanded, since trusses could then be designed to be more economical than conventional construction, realizing economies of labour in both fabrication and installation.

The introduction and improvements in metal connector plates and the use of automated or hydraulically powered machinery in the assembly of trusses created further labour economies and greatly accelerated the use of trusses.

Trusses became popular on a broad scale, both geographically and by builder size; the size of builder firms was not of consequence as small builders were just as likely to use the pre-assembled trusses as were larger builders. Some larger builders also set up facilities to produce their own trusses.

The use of roof trusses in Canada increased at an accelerated rate during the 1960s; it is estimated that by 1970, about 90 percent of the single-family houses built incorporated roof trusses.

Although Canadian metal truss plate manufacturers, such as Trans Canada Truss Corporation, eventually began to compete with their U.S. counterparts, most of the systems used in Canada were those developed in the United States. American technology in plate manufacturing and truss assembly is the basis for the Canadian truss industry.

GOVERNMENT-IMPOSED STANDARDS EVOLVE

Since various proponents of the truss plate system developed individual "ad hoc engineering" approaches, considerable differences developed among the systems as a result of fierce competition among their manufacturers. To provide a benchmark by which these designs could be controlled, NRC's Associate Committee on the National Building Code agreed to develop span tables for simple Howe and Fink type trusses up to a 12 metre (40 feet) span. These spans were based on government-sponsored laboratory tests by NRC and FPL. The spans, first included in the 1975 Residential Standards, are the same as those in the 1985 edition of the National Building Code. This allows a truss manufacturer the third option of using span tables to determine allowable truss member sizes.

Throughout the early development of roof trusses in Canada, it was extremely important for truss plate manufacturers to have their system accepted for use in NHA housing. This was the only means by which many products could be recognized as having been subject to responsible evaluation procedures.

SUMMARY

The meaningful features of the story on roof trusses include the following elements:

- A long gestation period occurred.

A period of about 20 years passed from the time the National Committee on Wood Utilization in the United States first released details of residential roof trusses to the time the modern metal plate connector was introduced in the early 1950s. Through this gestation period, improvements were made in the truss, particularly in the truss connector, until specifications met the needs of the building community. This was followed by rapid adoption over the ensuing decade. The main breakthrough in Canada was the development of national performance criteria by which the truss design could be evaluated.

- "Process need" was the stimulus.

Wartime and expected strong postwar demands created pressures for the building industry to become more efficient; both labour and materials were in short supply. These pressures affected many facets of the homebuilding construction process, with the development and adoption of trusses being the most important. Peter Drucker refers to this source of change as process need.

- Development work on trusses was done outside the housing industry.

U.S. federal government agencies played an important role in truss research and in creating interest for trusses in the building industry. Building material manufacturers, often through supporting university research efforts, also played an important role in the late 1940s and early 1950s. Hence, the reaction to the pressures for enhanced efficiency came from outside the homebuilding industry.

- Canadian builders adopted U.S. truss technology.

The initial designs for lightweight residential roof trusses originated in the United States. Canadian builders became familiar with these trusses through U.S. trade publications or attendance at U.S. builder conventions. However, these truss systems could not be used without regulatory approval in Canada; adaptations were necessary to meet the conservative snow load design requirements of many municipalities.

- Federal truss requirements ultimately were positive for the widespread use of trusses.

While local regulations and CMHC acceptance procedures undoubtedly delayed the initial adoption of trusses in Canada, the ultimate result of national truss acceptance criteria for NHA houses were positive. Early on, federal research agencies investigated the

load-bearing capability of trusses compared to the traditional joist and rafter construction and found the standards applied to trusses to be excessive. These agencies formulated performance criteria for trusses, which significantly assisted truss acceptance.

The key was the initiative taken by building scientists and engineers from CMHC, NRC and the Canadian Forest Products Laboratory, who were willing to challenge traditional methods. They questioned why new trusses that followed standard design principles resulted in a heavier product than was necessary. They undertook innovative testing and evaluation and developed realistic performance standards for the new technology.

- Widespread use took a decade.

A decade elapsed from the time trusses began to be used in significant numbers until virtually every builder across the country was using trusses. However, as traditional roof-framing practices were virtually unchanged over the previous 100 years or so, the rapid conversion to roof trusses can be regarded as remarkable.

GENERALIZED IMPLICATIONS FOR TECHNOLOGICAL ADVANCEMENT

A description of one technological advancement cannot illustrate all or most technical improvements introduced and adopted by the single-family homebuilding industry over the postwar period. However, the roof truss adoption process demonstrates what can be expected, given the analysis of the process of change and the characteristics of the single-family homebuilding industry.

The source of the change was internal to the housing industry, but the research and product development was undertaken outside the housing industry. The large number of small firms appears to have precluded the housing industry from being the initiator.

The process was aided by the prospect of a rapidly growing market for new houses. Although some confusion existed about the patentability of the various truss plate configurations, the designs developed by the manufacturers were covered by copyright laws that protected the engineering investment costs. This increased the potential reward to manufacturing firms undertaking the development work.

Both NRC and CMHC played a positive role in trusses gaining widespread acceptance, which illustrates that regulatory bodies can be proactive concerning technological advancement. Typically, regulatory bodies have tended to restrain rather than actively promote change.

CHAPTER FOUR
CASE STUDIES OF PRONOUNCED CHANGES IN MARKET CONDITIONS AND THE SINGLE-FAMILY HOMEBUILDING INDUSTRY

Changes to the technology of homebuilding that result in improved efficiency or better quality construction favour not only firms in the housing industry but also housing consumers and the economy in general. However, not all change is positive for the housing industry; some changes can be adverse, notably unexpected and sudden shifts in the demand for new housing, especially downward. Even though the number of single-family building firms and their composition adjust quickly to pronounced shifts in demand, it should not be inferred that these changes have no adverse consequences.

Sharp declines in demand can result in significantly reduced profits or even losses, firms leaving the industry and layoffs of management and skilled trades personnel, many of whom may seek employment in other industries. Similarly, sharp increases in demand, by increasing profits, attract new firms into the housing industry, including entrepreneurs and workers who may have only limited housing experience, thus potentially resulting in a lowering of the quality level. These increases in demand can put severe pressure on available supplies of labour and materials, thereby causing input prices to accelerate. These higher input costs may become part of the cost structure even when demand softens.

Two case studies illustrating the response of the single-family homebuilding industry to pronounced shifts in the demand for new houses are presented in this chapter: the pronounced decline in demand for new houses throughout the country during the severe 1981–82 economic recession; and the upsurge in demand for new houses in Ontario, particularly in the Toronto area, during the 1985–early 1987 period. The purpose of these case studies is to examine the single-family homebuilding industry's response to sudden marked changes in demand and the resulting consequences on the overall economy and housing market.

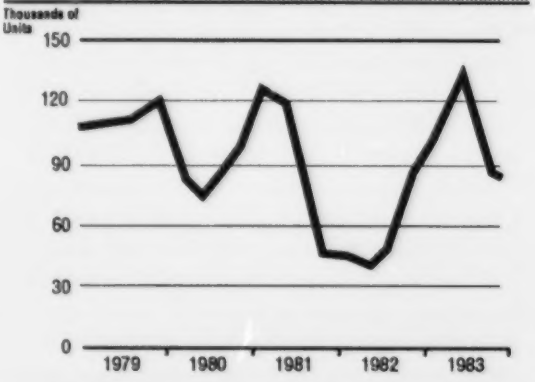
The discussion for each study begins with a review of the magnitude and causes of the shift in the demand for new single-family homes. This is followed by a consideration of the initial impact of the change in demand on builders of single-family homes and the response of the overall industry to these changes. Finally, the consequences of these responses for the single-family homebuilding industry and for the broader housing market and economy at large are examined. A summary of the case studies, including a brief look at the broader relevance of this experience, follows.

THE PRONOUNCED DECLINE IN THE DEMAND FOR NEW SINGLE-FAMILY HOMES IN 1981–82

The Decline in Demand

The single-family housing market was in a precarious position entering the decade of the 1980s. A tight monetary policy had caused interest rates to rise sharply in the latter months of 1979. The five-year term mortgage rate jumped from 11 percent to over 14.5 percent in a matter of months. Over the next three years, interest rates experienced large and irregular fluctuations but remained historically high, as monetary authorities in the United States and Canada struggled to control inflation. (See Figure 1.)

FIGURE 1. SINGLE-FAMILY HOUSING STARTS BY QUARTER [a] SAAR, CANADA, 1979–83 [b]



Source: CMHC.

[a] Approximated by single-detached starts.
[b] SAAR = Seasonally adjusted at annual rate.

As demonstrated in Figure 2, the demand for single-family homes for the most part responded inversely to the direction of change in interest rates. Demand for both new and resale homes declined in response to the sharp rise in interest rates between late 1979 and early 1980 when the five-year term mortgage rate momentarily reached 17 percent. The rate of annualized seasonally adjusted single-family starts (starts tend to lag behind changes in interest rates by a few months) fell from approximately 110,000 units in the latter half of 1979 to about 80,000 in the first half of 1980—a 27 percent decline.

FIGURE 2. MLS RESIDENTIAL SALES/ACTIVE LISTINGS RATIO BY MONTH, 1980–83

Source: Clayton Research Associates based on data from the Canadian Real Estate Association.

Note: MLS = Multiple Listing Service. Data cover all Census Metropolitan Areas, are three-month moving averages, are not seasonally adjusted and are not available before 1980.

The weakness in single-family house demand was short-lived. Interest rates declined quickly the summer of 1980, with the five-year term mortgage rate dropping from 17 percent to 13 percent in just three months. The economy was buoyant, particularly in British Columbia, Alberta and the Toronto area.

Demand for both resale and new houses increased rapidly through the latter half of the year. While national data suggests a Canada-wide explosion in demand, which continued through to the early months of 1981, the boom was concentrated actually in certain parts of the country where the economies were buoyant. Remarkably, demand continued to expand as interest rates drifted upward in the latter half of 1980. The strong demand in early 1981 reflected the entry of speculators and investors into the marketplace, as well as conventional buyers rushing to buy before prices rose further.

The markets collapsed in areas where activity was fervent in the spring of 1981 when monetary authorities in the United States and Canada decided that drastic action was required if intensifying inflation was to be stopped. Mortgage interest rates rose sharply, reaching 21.5 percent for five-year term mortgages in September. Housing market activity across the country came to an abrupt stop. By the final quarter of the year, the annualized rate of seasonally adjusted single-family starts had fallen to 47,000 units, a decline of 60 percent from first-half activity and over 55 percent lower than activity in the latter half of 1979. The MLS residential sales to active listings ratio fell from 30 percent in April of 1981 to less than 10 percent by October.

The explosive rise in interest rates put the economy into its worst downturn since the Great Depression. The recession lasted for five quarters, from the fourth quarter of 1981 through the fourth quarter of 1982. The level of real gross domestic product attained in the second quarter of 1981 was not regained until the third quarter of 1983.

The single-family housing market remained in the doldrums until the third quarter of 1982 when housing demand began to pick up. Demand was positively affected by a decline in mortgage interest rates in the latter months of the year (to a still high 14.5 to 15 percent) together with federal subsidy assistance to home buyers under the Canadian Homeownership Stimulation Plan and support programs launched by several provinces.[1]

The pronounced weakness in the demand for new single-family houses for the country as a whole thus lasted for about five calendar quarters, from the late spring of 1981 to late summer in 1982.

Response By and Impacts on the Single-family Homebuilding Industry

There are several reactions homebuilding firms can take to a pronounced drop in demand: They can immediately cut staff and overhead to reduce costs; they can presume that the decline is temporary and reluctantly accept lower profits or even incur losses; they can aggressively aim for an increased market share; they can change the nature of their product; they can diversify; or they can leave the industry. These choices are not unique to homebuilders. Any firm facing sharply

reduced demand has the same decision matrix. As with other industries, homebuilders can also convince government to provide financial assistance to individual firms or to the purchasers of their product to stimulate demand.

The following discussion provides some insight into the response of the single-family homebuilding industry to the downturn in demand in 1981–82. Unfortunately, as there is no single comprehensive information source on this topic, the available information is piecemeal and at times conflicting. The findings are thus, to some extent, based on imperfect information.

■ The number of builders significantly dropped.

Two comprehensive sources of statistical information on the number of single-family homebuilders in the early 1980s are readily available: Statistics Canada's annual census of residential general contractors for the country; and companies registered with the Ontario New Home Warranty Program, where membership is compulsory (Table 1). Both data series have a number of limitations for the purpose intended here but, on the whole, the Ontario New Home Warranty Program statistics appear to be more representative of what happened in terms of numbers of firms.[2]

Table 1. Number of Single-Family Homebuilding Firms, Canada and Ontario, 1980–83

	Census of Residential General Contractors		Ontario New Home Warranty Program[a]
	Canada	Ontario	Ontario
1980	n.a.	n.a.	2,020
1981	8,965	2,733	1,894
1982	8,870	3,113	1,434
1983	8,678	2,894	2,060

Source: Statistics Canada and Ontario New Home Warranty Program.

[a] Number of registered builders enrolling at least one new home during the year.

The Statistics Canada data suggest that the number of single-family builders across Canada declined only slightly in 1982 to 8,870 firms from 8,965 in 1981 (a decline of one percent) and experienced a further slight decline to 8,678 firms in 1983. Such a small decline in the number of builders in 1982 is surprising given the magnitude of the drop in demand (the number of single-family starts fell from 116,364 units in 1981 to 72,698 units in 1982, a 38 percent decline).

The Statistics Canada data show a modest increase in the number of single-family homebuilders in Ontario between 1981 and 1982 (from 2,733 to 3,113 firms), even though the year-to-year drop in single-family starts was only marginally lower in Ontario than Canada (31 percent compared to 38 percent for the entire country). Data from the Ontario New Home Warranty Program, in contrast to the Statistics Canada data, show a 24 percent decline in 1982 in the number of registered builders in that province who built at least one home. This followed a six percent decline in 1981 from 1980. The data for 1983 from the two sources also give conflicting results, with the Statistics Canada data showing a decline in the number of Ontario (and Canada-wide) builders and the Ontario New Home Warranty Program data showing an increase.

The inference from this comparison of the two data sources regarding changes in the number of Ontario builders in 1982 is that there was likely a significant drop in the number of builders active in the single-family home market across Canada, resulting from the 1981–82 downturn in demand.

■ A large number of new firms still entered the industry in 1981–82.

Examining the annual changes in the total number of builders of single-family homes masks an inherent vitality in the structure of the industry. True, a large number of firms left the industry in 1981–82: The Ontario New Home Warranty Program data indicate that 2,237 builders deregistered in these two years, nearly double the change in the total number of builders between the beginning of 1981 and the beginning of 1983.[3]

However, a considerable number of firms entered the industry during these years: The Ontario New Home Warranty Program data show that over 1,000 new firms entered the industry in the two years of 1981 and 1982, with 487 of these entering in 1982, the year the recession was at its worst. Data from Quebec also indicate a number of new builders—a total of 728 firms—[4] entered the single-family homebuilding industry in 1981–82 in that province.

Many of these new firms likely were established by tradespeople who, responding to a lack of work from the builder community, built one or two houses on their own. However, a number were established by

entrepreneurs sensing an opportunity when the recession ended. For example, Stolp Homes was established in late 1982, as was Park Lane Homes in Vancouver. Both had become large builders in their respective markets by the mid-1980s.

■ Many builders reduced the scale of their operations.

Although the Statistics Canada data show only a marginal decline in the total number of single-family builders across Canada in 1982, the decline in medium-sized and large firms was fairly pronounced, at 23 percent.[5] This reduction in size is reflected in the decline in average revenues per single-family homebuilding firm. In current dollar terms, the average revenue per builder declined by 22 percent in 1982 from $575,000 in 1981. While average revenues increased in 1983 and 1984, they did not recover to the 1981 figure. The decline in revenues is even larger in inflation-adjusted dollars. Average real revenues fell by 23 percent in 1982 and remained depressed over the next two years. (See Table 2.)

Table 2. Average Revenue of Homebuilding Firms Specializing in New Single-Family Construction Canada, 1981–84

Average Revenue Per Firm	1981	1982	1983	1984
Dollars (000s)				
Current	575	451	465	496
Real[a]	575	442	456	469
Index (1981=100)				
Current dollars	100	78	81	86
Real dollars	100	77	79	82

Source: Clayton Research Associates based on data from Statistics Canada.

[a] Average current revenue deflated by the implicit price index for new residential construction to express in terms of constant 1981 dollars.

■ There was a sharp deterioration in financial performance.

The 1981–82 recession hurt most builders financially since their revenues declined more than their costs. Profits tumbled, and losses increased. In 1981, the profitable firms specializing in new single-family house construction earned profits of $320 million. Money-losing firms had losses totalling $79 million, equivalent to about 25 percent of the profits earned by the profitable firms.

Table 3. Total Profits and Losses of Homebuilding Firms[a] Specializing in New Single-Family Construction Canada, 1981–84

	1981	1982	1983	1984
Millions of Dollars				
Profits	320	179	217	239
Losses	79	188	94	83
Index (1981=100)				
Profits	100	56	68	75
Losses	100	238	119	105

Source: Clayton Research Associates based on data from Statistics Canada.

[a] Total profits and losses of homebuilding firms reporting profits or losses, respectively.

In 1982, total profits fell by 44 percent to $179 million. Since industry losses climbed to $188 million, total losses in the year were higher than total profits. Total profits over the subsequent two years did not reach the 1981 level.

This sharp deterioration in financial performance triggered a number of adjustments to operations by firms intent on remaining in the industry.

■ The extent of the adjustment depended on the seriousness of the problems.

The nature and intensity of the problems faced by builders as the economy moved deeper into recession were not uniform. Hence, the impact of the recession on operations differed among firms.

A study of the Quebec homebuilding industry found the most frequent problems faced by Quebec builders were excessive inventories of lots and unsold houses.[6] According to the study, those firms having too many lots modified their operations and management more than other firms, with many either selling their lots at a reduced profit to other builders or building a different type of product than originally planned.

■ Most builders switched to a pre-sale mode of operation.

From the mid-1940s to the late 1970s, most builders across the country built largely on a speculative basis, constructing houses before they were sold. The large surplus of completed but unsold houses in the late 1970s—a result of the record number of new houses being built—caused many builders, particularly in

Ontario, to rethink their marketing and sales strategies. Because speculative building is highly risky in volatile times, builders in the Toronto area started using sales trailers and selling from plans. Sandbury Homes was one of the leaders of this pre-selling technique.

The 1981–82 recession resulted in the adoption of universal pre-selling by the single-family homebuilding industry across the country. A June 1983 survey of builder members of the Canadian Home Builders' Association found that just 11 percent of respondents were building mostly or only on a speculative basis.[7] In contrast, 59 percent sold only or mostly on a pre-sale basis, while 30 percent reported a mix of speculative and pre-sale building. Pre-selling was most prevalent in Ontario and the Prairies. The popularity of pre-selling in 1981 was documented in a study of Winnipeg builders.[8]

Another marketing approach used in the early 1980s was "creative financing" provided by the builder. One example of this was buy-downs, in which the builder offered a certain percentage reduction in interest rates. Another example was a land lease/house purchase plan in which the buyer purchased the house but leased the land until he or she could afford to pay for it.[9] Many of these special financing programs were developed in western Canada.

The recession also appears to have resulted in builders giving more consideration to the preferences of prospective buyers. The 1984 survey of Quebec homebuilders revealed that 75 percent felt they were more receptive to purchasers' needs than they had been five years earlier.[10]

- Many builders modified their product.

Immediately before the 1981–82 recession, the primary market for new single-family homes were move-up buyers, households in their '30s and '40s who had previously owned a home. These buyers normally have represented the primary buyers for new housing since older resale homes, which are typically lower-priced, satisfy the demand of most first-time buyers.

As the onslaught of the recession dried up this type of demand, many builders responded by redirecting the appeal of their product to first-time buyers by reducing lot and house sizes, as well as house specifications. In high-cost markets, such as Vancouver and Toronto, the average price of new housing dropped dramatically.

Other builders responded by moving into the much smaller expensive custom house market.

- Some builders diversified.

In general, when the demand for a product drops sharply and is not anticipated to recover immediately, firms producing that product investigate other opportunities. For many builders of new housing, the renovation market was one such opportunity. Unlike spending on new home construction, renovation spending did not decline in real terms in 1982.

The 1984 study of the Quebec homebuilding industry showed that many Quebec builders, particularly those plagued with an excessive inventory of unsold houses, diversified into renovation by either striking out alone or merging with construction firms more experienced in the renovation field.[11]

Impact on Other Sectors of the Economy

The pronounced downturn in the demand for new single-family homes during the 1981–82 period had widespread repercussions on other sectors of the economy. Since most of the labour employed by homebuilding firms are contracted from special trade contractors, the impact of any changes on the labour market beyond the industry itself is large. Moreover, changes in the output of the housing industry has pervasive ramifications on other industries at both the indirect economic impact stage (especially manufacturing and trade) and the induced impact stage (especially trade, service and manufacturing).[12]

The downturn in demand included the following repercussions:

- A large negative impact was felt on the construction labour market.

While labour market data are not available for single-family house construction, available data for the total construction industry (including non-residential and engineering construction) provide insight into the severity of the impact of the 1981–82 recession on the construction labour market. (See Table 4.)

Construction employment across Canada reached a seasonally adjusted record of 660,000 persons in June 1981. The number declined rapidly to 558,000 jobs

Table 4. Labour Market Indicators Construction Industry and All Industries Canada, 1981–84

	1981	1982	1983	1984
Total Employment Persons (000s)				
Construction industry	651	597	566	572
All industries	11,006	10,644	10,734	11,000
Total Employment Index (1981=100)				
Construction industry	100	92	87	88
All industries	100	97	98	100
Unemployment Rate (%)				
Construction industry	13.0	20.6	24.2	23.0
All industries	7.6	11.0	11.9	11.3

Source: Clayton Research Associates based on data from Statistics Canada.

seasonally adjusted in January 1983, a decline of 15 percent. In terms of average annual numbers, construction employment fell from 651,000 persons in 1981 to 566,000 in 1983. Hence, a total of 85,000 jobs were lost between 1981 and 1983.

The decline in construction employment was much more pronounced than the decline in employment in the overall economy. In 1982, on average, there were eight percent fewer jobs in the construction industry than a year earlier—the comparable decline for total employment in the country was three percent.

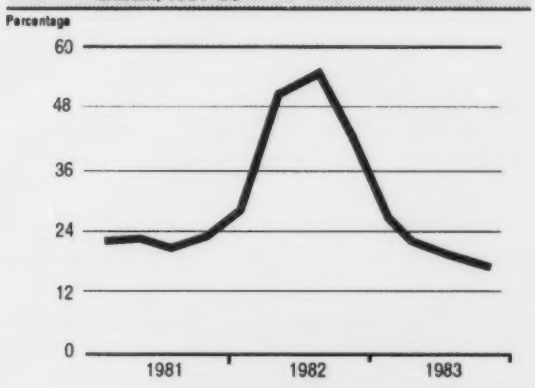
Not only did large numbers of construction workers lose their jobs, but those who kept their jobs worked somewhat shorter hours. In November 1982, the average hours worked per week by employees of special trade contractors was two percent lower than a year earlier.

- Building material manufacturers were also seriously affected.

While seperate data are not available for manufacturers whose materials are used in single-family home construction, data for manufacturers of all construction materials demonstrate the nature of the adjustments faced by this industry as a consequence of the decline in construction activity (Figure 3).

The downturn in construction activity caused an involuntary build-up in inventories of construction material manufacturers. The proportion of construction material manufacturers responding to Statistics Canada's business conditions survey reporting their inventories as being too high climbed sharply in the first half of 1982. By mid-1982, over half of all respondents stated their inventories were too high, up considerably from only 20 percent in the third quarter of 1981.

Figure 3. Percentage Of Construction Material Manufacturers Reporting Inventories Too High Canada, 1981–83



Source: Statistics Canada.

Manufacturers responded to high inventories by cutting production. The percentage of construction material manufacturers who expected their level of production to be lower in the next three months than in the previous three months increased from 30 percent in the first quarter of 1981, before the recession, to over 50 percent in the last two quarters of 1982 and the first quarter of 1983; a peak of 59 percent was reached in the final quarter of 1982, at the bottom of the recession.

Impacts on the Overall Economy and Housing Market

The implications of the 1981–82 housing market downturn for the economy in general and the overall housing market were as follows.

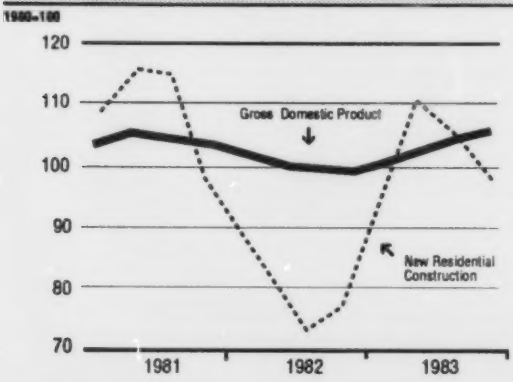
- The new housing sector aggravated the economic downturn but aided the recovery.

The acceleration in mortgage interest rates in early 1981 had a much more immediate negative effect on the new housing sector than the economy as a whole. Data for total real new residential construction spending show that housing led the economic downturn. Using

1980 as a base, the volume of new residential construction activity fell 27 percent by the third quarter of 1982 compared to a much smaller 0.3 percent drop in overall economic activity (Figure 4). Clearly, the new housing sector was a major contributor to the 1981–82 recession.

However, this sector also was a major force in the economic recovery that began in 1983. Between the final quarter of 1982 and the second quarter of 1983, the value of new residential construction activity climbed by 46 percent versus a 3.5 percent increase in overall economic activity.

FIGURE 4. CHANGES IN NEW RESIDENTIAL CONSTRUCTION SPENDING AND GROSS DOMESTIC PRODUCT CANADA, 1981–83 [a]



Source: Statistics Canada.

[a] Using occasionally adjusted, constant dollar data.

- Underpinnings were set for future housing shortages and an escalation in prices.

In the short run, those who could still afford to purchase new houses benefited to some extent from the housing market downturn in 1981–82. It was a buyer's market, and they could negotiate a much better deal than in a healthy market. The price of constant quality new houses declined in 1982, according to Statistics Canada. Many buyers also found that in response to their wishes, builders would change the design and materials used. This was a new experience in many parts of the country. On the downside, however, all buyers faced excessively high interest rates.

The marked downturn in the market in 1981–82 was also creating conditions that could produce a housing shortage and escalating prices when the economy improved.

According to a submission made by the Canadian Home Builders' Association to the federal government in May 1982,[13] the combination of underbuilding and rapid population growth in the traditional homebuying age groups was expected to cause a large buildup of unsatisfied homeownership demand at the same time the housing industry was losing workers and firms. The homebuilding industry would not have the immediate capacity to satisfy this demand quickly once affordability returned to more normal levels. Therefore, future strong demand and a sluggish supply response would combine to cause widespread escalation in prices of resale and new homes; many potential first-time buyers would again be priced out of the market. The submission argued that the future explosion in home prices could be moderated considerably if some of the unsatisfied demand could be released immediately.

The federal government appears to have heeded the builders' message: In a previous June budget, it launched the Canadian Homeownership Stimulation Plan (CHOSP), which stimulated the demand for new houses to a considerable extent in the final quarter of 1982 and the early months of 1983.[14]

THE PRONOUNCED RISE IN DEMAND FOR NEW SINGLE-FAMILY HOMES IN ONTARIO DURING THE 1985–EARLY 1987 PERIOD

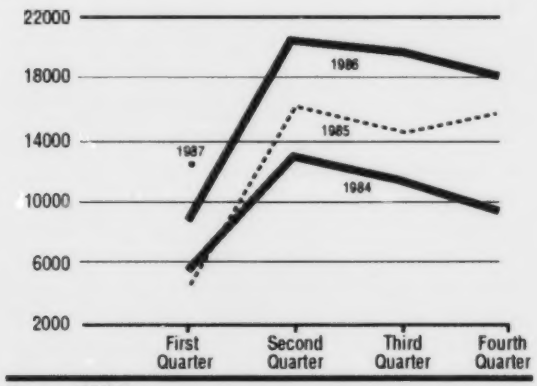
This case study focuses on Ontario, and particularly the Toronto area, rather than the national scene for two reasons: More statistical information is available on the industry responses and impacts on builders of single-family homes in Ontario; and the surge in single-family house demand over the 1985–early 1987 period was largely concentrated in southern Ontario.

The Surge in Demand

The performance of the new single-family housing market in Ontario had been rather pallid for the two years following the ending in May 1983 of the grants to buyers under the Canada Homeownership Stimulation Plan (CHOSP) and the termination of the Ontario

Government's Renter-Buy Program at the end of 1982. These programs successfully stimulated ownership demand during late 1982 and, for CHOSP, early 1983. The lull in demand that occurred for a period after their demise was expected.

Figure 5. Single-Family Housing Starts by Quarter Ontario, 1984–87



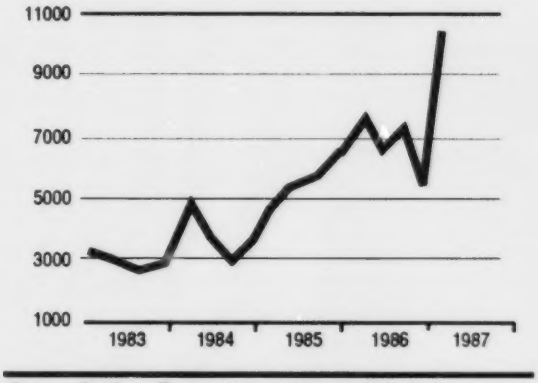
Source: CMHC.

Demand began to pick up early in 1984 but was interrupted by a rise in mortgage interest rates (the five-year term rate climbed from 13 to 15 percent during the first half of the year). However, the rise in interest rates only delayed the recovery in the demand for new single-family houses. The number of baby boomers in the traditional homebuying age groups was growing in the province, and a strong resurgence in the economy, which had begun in 1983, continued through 1984. Net migration accelerated as residents of other provinces, particularly from Western Canada, moved to Ontario, attracted by the growing employment opportunities (many of the in-migrants had been residents of Ontario previously).

The decline in mortgage interest rates during late 1984 released the demand pressures that had been escalating in southern Ontario, first in the latter part of the year for resale housing and then in early 1985 for new houses. The surge in demand continued until early 1987. Single-family starts in the province climbed from 38,099 units in 1984, which was slightly lower than in 1983, to 64,726 units in 1986, a 70 percent increase. Starts in the first quarter of 1987 were 48 percent higher than a year earlier. The 1986 number was a record for single-family starts in the province.

In the Toronto area, single-family house sales exploded from 2,778 homes in the third quarter of 1984 to 7,320 homes two years later, a 163 percent increase. Sales peaked at 9,910 homes in the first quarter of 1987. (See Figure 6.)

Figure 6. Sales of New Single-Family Homes in the Toronto Commutershed, 1983–87 [a]



Source: Brethour Research Associates on behalf of the Toronto Home Builders' Association.

[a] Single-family approximated by freehold sales.

Response and Impacts on the Single-Family Homebuilding Industry

Specific information on Ontario and Toronto is used to document the response of the single-family homebuilding industry to the surge in demand for new houses.

- Builders responded cautiously.

Single-family homebuilders had a difficult time believing the turnaround in the market they had been longing for had finally arrived. They took lots of orders, virtually all on a pre-sale basis since very few builders were building speculative housing. They priced their product very conservatively since they were uncertain as to just how solid the growing demand was. Builders also promised closing dates based on their recent experience on the time needed to build houses.

- Many new firms entered the industry.

The number of builders of single-family homes in the province expanded rapidly between the end of 1983 and

the end of 1986 (Table 5). The Ontario New Home Warranty Program reported the number of registered builders constructing at least one home climbed by nearly two-thirds over this period. This represents an increase from 2,060 to 3,419 firms.

Table 5. Number of Single-Family Homebuilding Firms Ontario and Toronto Area, 1983–86

	Ontario New Home Warranty Program[a]		Statistics Canada
	Ontario	Toronto Area	Toronto Area
1983	2,060	565	518
1984	2,268	575	570
1985	2,705	652	644
1986	3,419	700	683

Source: Statistics Canada and Ontario New Home Warranty Program.

[a] Number of registered builders enrolling at least one home during the year.

However, the actual number was even larger since firms were also leaving the industry at the same time; an average of 641 builders per year were deregistered with the Ontario New Home Warranty Program over the 1984–86 period.[15]

In the Toronto area, where housing demand had been stronger than for the entire province before the boom, the expansion in the number of builders between 1983 and 1986 was less pronounced, though still considerable. Seven hundred firms were building single-family homes in 1986, an increase of 135 firms from three years earlier.

- Many existing firms expanded their operations.

Not only did the number of builders increase but the average size of each firm expanded. Available data from Statistics Canada for the Toronto area show that the average number of houses built per builder rose from 22 in 1984 to 33 in 1986, an increase of 50 percent.

Largely as a result of firm expansion, the number of builders constructing 100 houses or more increased from 24 in 1984 to 73 in 1986 (Table 6). The share of the market accounted for by these large builders climbed from 40 percent of the houses built in 1984 to 65 percent in 1986.

Table 6. Structure of the Single-Family Homebuilding Industry Toronto Census Metropolitan Area, 1984–86[a]

Number of Single-family Homes Built	Increase in Number of Builders by Size		
	1984	1985	1986
	Number of Firms		
1–19	431	456	479
20–99	115	144	131
100 and over	24	44	73
Total	570	644	683
Average Number of Houses Built			
All firms	22	28	33
Builders building 100 or more houses	202	220	199
Proportion of all houses constructed by firms building 100 or more houses (%)	40	53	65

Source: Clayton Research Associates based on data from Statistics Canada.

[a] Approximated by building permits issued for single-detached houses.

- Many builders were unable to provide completed houses when promised.

Builders selling homes in early 1985 had no reason to suspect they would encounter difficulties in securing labour from the special trade contractors or materials from suppliers. This occurred, however, particularly in the Toronto area. As the combined demands of individual builders exceeded the availability of labour and materials, builders encountered serious troubles meeting closing dates.

Some 60 percent of home buyers surveyed in the Toronto area who closed in the final quarter of 1985 or the first quarter of 1986 experienced delays in their closings, with the average delay at 2.3 months. However, the problem worsened: Buyers closing in the middle two quarters of 1986 reported an average delay of 3 months.

The unanticipated explosion of demand also put acute strains on lot supply. Some builders sold houses on lots that had only received draft approval. Inclement weather and labour strife contributed to the delays as well.

- Builders responded by rapidly increasing prices and lengthening promised closing dates.

Builders hesitant to raise prices earlier moved with a vengeance in 1986 and the early months of 1987. Resale house prices had begun to escalate in late 1985, and new house prices slowly followed. According to Statistics Canada, between December 1985 and May 1987, prices for quality new houses climbed by 45 percent in Toronto, 20 percent in Kitchener and 28 percent in London.

Table 7. Delay Between Original and Actual Occupancy Dates for Purchasers of New Homes Toronto Commutershed, Percent

Length of Delay	Purchasers Closing Oct. 1985–March 1986	Purchasers Closing April 1986–Sept. 1986
No delay	42	46
Less than 2 months	37	29
3–4 months	15	13
More than 4 months	6	12
Total	100	100
Average delay for buyers reporting a delay (months)	2.3	2.9

Source: Clayton Research Associates Survey of New Home Buyers.

Promised closing dates were lengthened. The Toronto Home Builders' Association took out full-page advertisements warning prospective buyers to expect closing dates of at least nine to 12 months from the time of purchase, two or three times the normal period.

- Construction quality and after-sales service became issues.

A sizable minority of buyers became unhappy with their builders. According to Clayton Research Associates' Survey of New Home Buyers, approximately 40 percent of Toronto area buyers closing in the 12 months ending September 1986 expressed overall dissatisfaction with their builders. Despite the obvious problems in the industry, however, builders were still able to satisfy almost 60 percent of their buyers.

A smaller but still significant proportion of buyers (30 percent) expressed some dissatisfaction with the construction quality of their new home (approximately 10 percent were very dissatisfied). Again, despite its obvious problems, the industry was able to satisfy a majority of its buyers.

Some 55 percent of buyers were particularly dissatisfied with after-sales services provided by their builders.

Impact on Other Sectors of the Economy

Just as the pronounced downturn in new residential construction in 1981–82 had a greater effect on other sectors of the economy than the initial impacts on the housing industry, so too did the rebound. As noted, manufacturing and trade are the industries most affected in the indirect stage of economic impact, with trade, service and manufacturing the primary beneficiaries of the induced impacts.

- The increase in construction industry employment outpaced overall employment growth.

The marked upturn in the demand for new single-family houses produced a comparable surge in residential construction activity. Employment data for the entire construction industry help to demonstrate the combined impact of the rise in single-family housing construction along with other sectors of construction. (See Table 8.)

Between 1984 and the first quarter of 1987, construction industry employment in Ontario increased at more than twice the rate of total employment. The unemployment rate in the construction industry also declined, but the rate of decline appeared sluggish when compared to the strength in job creation in the construction industry, particularly in the Toronto area.

Although the shortage of construction workers remained a serious problem in the Toronto area, several reasons are possible for the high unemployment rate in the construction industry in Ontario as a whole, as well as in the Prairies and the Atlantic provinces: the income cushion provided by unemployment insurance; an unwillingness by the unemployed to relocate; union obstacles to new members; or a mismatch between the skills of available workers and the needs of the marketplace.

Table 8. Labour Market Indicators Construction Industry and All Industries Ontario, 1984–86

	Annual		
	1984	1985	1986
Total Employment Persons (000s)			
Construction industry	219	231	253
All industries	4,243	4,402	4,555
Total Employment Index (1984=100)			
Construction industry	100	105	116
All industries	100	104	107
Unemployment Rate (%)			
Construction industry	17.5	14.9	12.2
All industries	9.1	8.0	7.0

	First Quarter[a]		
	1986	1987	Percent Change
Total Employment Persons (000s)			
Construction industry	214	227	6.1
All industries	4,412	4,525	2.6
Unemployment Rate (%)			
Construction industry	18.9	15.7	-16.9
All industries	7.9	7.5	-5.1

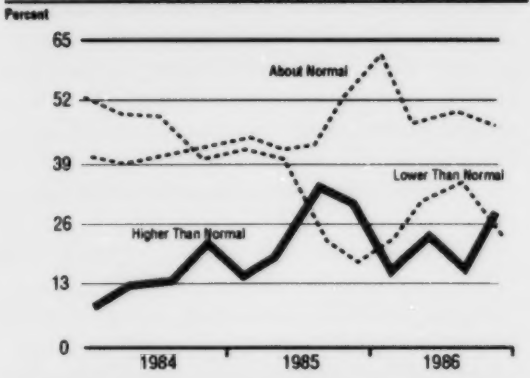
Source: Clayton Research Associates based on data from Statistics Canada.

[a] Not adjusted for seasonal variations.

- Sharp improvement was demonstrated in the construction material manufacturing industry.

The manufacturers of construction materials also benefited from the increase in residential construction activity. Canada-wide data for all manufacturers of construction materials over the 1984–86 period showed a considerable decline in the proportion of these firms reporting a lower than normal backlog of unfilled orders (from 52 percent in the first quarter of 1984 to 19 percent in the fourth quarter of 1985). Over the same period, manufacturers reporting a higher than normal backlog of unfilled orders rose from eight percent to 28 percent. The situation appeared more stable through 1986, with a comparatively high percentage still reporting higher than normal unfilled orders. (See Figure 7.)

Figure 7. Backlog of Unfilled Orders Construction Material Manufacturers Canada, 1984–86



Source: Statistics Canada.

The market for building products became very much a seller's market. In early 1987, the Manufacturers' Council of the Canadian Home Builders' Association reported: "There's no such thing as an unhappy supplier these days ... just some that ship further than others."[16] Ongoing shortages were reported in drywall, brick and stone, and hardware; periodically, difficulties were reported in obtaining doors, glass, roofing materials, plumbing fixtures and electrical materials.

Clearly, the construction boom, centred in Ontario and to a lesser extent in Quebec, produced demands on many materials manufacturers that were beyond their capacity to supply. Ultimately, the strong demand and finite capacity caused prices of the affected materials to rise. This, in turn, resulted in manufacturers taking steps to expand their capacity. But the response was sluggish since it takes time (frequently a year or more) to build new plants or install new equipment.

Impacts on the Overall Economy and the Housing Market

The sharp increase in the demand for single-family houses in southern Ontario from late 1984 to early 1987 caused a number of economic repercussions for the housing market.

- The escalation in house prices and the excess demand for labour added to inflationary pressures.

Both the sharp rise in house prices directly and the strong demand for construction labour indirectly have resulted in higher inflation and wages than would have been the case if the surge in housing demand had not occurred. New house prices are a component of the collection of goods and services constituting the consumer price index. Hence, a rise in house prices directly affects the inflation rate.

The higher carrying costs associated with the purchase of a new or resale house results in workers trying to keep up with inflation by demanding higher wage settlements. The higher wage rates paid to construction workers could cause other workers to demand larger settlements as well.

Indicative of inflationary pressures, a rapid increase in home prices caused Toronto's consumer price index to rise by a year-over-year 6.3 percent in June 1987. This, reports the Bank of Canada, compares with increases in most other urban areas from 2.75 to 5.25 percent.[17] The Bank of Canada also notes that wage settlements in the Toronto residential construction trades exceeded 10 percent, well above the 4 percent rise in base wage rates in major collective agreements in the first half of 1987.[18]

- Seeds sown for a housing downturn.

The sharp rise in house prices adversely affected affordability. Significantly fewer prospective first-time buyers can now afford to buy a new or resale home than before the price escalation occurred. Priced out of the market for a single-family house in a convenient location, large numbers of prospective buyers have little choice but to remain renters or to accept a second-best home purchase choice (for example, a condominium apartment or, in the case of households in the larger metropolitan markets, a house located further from the centre of the urbanized area).

- Many buyers inconvenienced by the delayed closings.

Many of the buyers who experienced delayed closings during the housing boom were seriously inconvenienced. Many were burdened with the financial costs of renting temporary accommodation or storing their belongings; others experienced personal dislocation by having to move in with friends or relatives.

On the other hand, inconvenienced buyers did not have to make mortgage payments on their new house during the delay. Also, while the boom was the main culprit behind the inconvenience caused by the construction delays, it had the compensating virtue of adding significantly to the value of the new home for most purchasers—an average of over five percent per quarter in the past two years.

The delayed closings have brought pressures on municipal and provincial governments to prevent a recurrence of this phenomenon. However, the danger is that legislation or regulations introduced to alleviate a problem created by a unique combination of circumstances will remain long after the original problem has been alleviated. Over time the controls may have unintended adverse affects on other facets of the housing markets.

SUMMARY

A number of findings can be reached from this review of the response of the single-family homebuilding industry to sudden change in the demand for new houses:

- The industry structure responds quite quickly to sharp shifts in demand.

The single-family homebuilding industry has exhibited remarkable flexibility to sudden demand shifts, both upward and downward. The number of firms increases or decreases, and existing firms grow or diminish in size in response to changing levels of demand. Some firms diversify in adverse times, while other entrepreneurs, sensing an opportunity, get into single-family building when market conditions are still negative.

- Housing cycles influence the structure and operational methods of the housing industry.

The characteristics of the single-family housing industry are in part owing to the industry experiencing periodic and irregular pronounced shifts in demand. A flexible structure with firms investing little in the way of off-site facilities for large-scale factory operations and the reliance on labour from special trade contractors are elements of this operational flexibility.

- Adjustments made by the construction labour and land markets and by building material manufacturers are much slower.

While the single-family homebuilding industry appears to adjust fairly readily to sharp shifts in demand, this is not the case for construction labour, residential land developers or building product manufacturers. When demand falls, special trade contractors lay off workers. Cushioned by unemployment insurance, the workers await the call to return to work. However, if the downturn is prolonged, some workers will accept jobs in other, less unstable industries. When demand returns, as it did in Ontario in the 1985 to early 1987 period, the supply of labour responds rather sluggishly to the demand. Workers must be persuaded to leave the jobs they turned to during the downturn and return to construction, and this process takes time. The same can be said for the relocation of unemployed workers in other geographic jurisdictions.

Similarly, the supply of serviced residential land cannot be increased immediately in response to a sudden rise in housing demand. Depending on the supply of land, it can take from a few months to several years to generate a significant increase in the supply of serviced residential lots.

Manufacturers respond to a downturn by reducing inventories and production. While labour can readily cut back, plant and equipment will still be underused. But this is not the time for making capital improvements. When demand returns, manufacturers hire back workers and add extra shifts to increase production. However, there is a finite limit of output they can produce from their existing plants and equipment. Plant expansion and adding new equipment can be time- and capital-consuming.

- A sudden surge in demand can lead to permanently higher labour and material costs for builders.

During labour shortages, as experienced in Ontario in 1986 and early 1987, builders bid up the price of labour. Where the industry is highly unionized, these higher costs become reflected in wage rate settlements. Yet when demand decreases, wages seldom are reduced. Only under very severe and prolonged adverse market conditions, as in Alberta in the early 1980s, is it usual for construction wage rates to actually decline.

Manufacturers, particularly in industries with a few large producers, also increase prices in response to rising demand but are reluctant to reduce prices when demand declines. Depending on the structure of the industry and the nature of the downturn, many manufacturers endeavour to maintain prices by reducing output.

The result is an increase of costs to builders. In times of rising demand prices rise, but in times of falling demand costs do not return to pre-boom levels.

- Builders become more responsive to buyers' preferences when demand is slow.

The home buyer benefits from a buyer's market by being able to obtain a house close to what he or she desires. To sell new houses, many builders spend more time discovering what the buyer wants and making design changes accordingly. In boom times, as the Toronto experience clearly shows, the buyer has little choice but to take whatever the builders offer.

CHAPTER FIVE
CONCLUSIONS

The single-family homebuilding industry in Canada is characterized by a large number of small firms, a much smaller number of medium-sized firms and a handful of larger firms. Even the larger firms typically are small in relation to average-sized firms in most goods-producing industries. On-site construction is still a primary characteristic of the construction process. The appearance and structural form of a single-family home has not changed dramatically over the postwar period, and builders engage in little research and development.

However, these characteristics do not necessarily mean the industry is backward and has not kept up technologically either in the environment in which it operates or with changes in other industries.

An industry operating in a very fragmented market which, unlike other goods-producing industries, must bring the product from the factory to the site for assembly and faces high transportation costs, cannot be expected to be structured the same or operate on the same principles as, for instance, industries that manufacture home appliances or automobiles. Moreover, the regulation of the single-family homebuilding industry at the municipal level aggravates the already fragmented demand.

At a time when the Economic Council of Canada is challenging Canadians to openly embrace positive change to assure their future prosperity, single-family home builders on their own, as well as other sectors of the housing industry to varying degrees, are unlikely to pursue or adopt positive technological change with any degree of vigour. The reason for this is the nature of the industry, which is a product of its market environment. However, such a statement does not imply the industry will not respond forcefully and positively to technological change, but that it needs outside encouragement and support.

Nor does this statement imply that the single-family homebuilding industry does not react to market changes. The industry has a high capacity for quickly adjusting to changes in its marketplace, as evidenced by the number and size of firms that have grown during times of increasing demand and by the number and size of firms that have decreased during times of contracting demand.

Government financial and related support to stimulate the search for and adoption of new or improved ideas, processes and products in the housing industry can be justifiable on economic grounds if the social benefits generated by change are sizable compared to the private-sector costs. That is, if a given change benefits the economic and social well-being of the country in excess of the costs to the private sector of implementing the change, government subsidy to encourage the change is warranted.

To the extent that government can moderate cyclical instability at the national level or within the various regions, this will have positive repercussions on the single-family homebuilding industry. Another area of possible government initiative is the support of housing research on both technological and innovative market products. Government has a particularly important role to play in evaluating innovative ideas, processes and products in use in other countries and disseminating those having merit to builders across the country.

Yet another potential area for government initiative is construction labour mobility. With the nature of the construction industry, workers should be highly mobile both geographically and between construction sectors. The sharp upturn in the demand for single-family housing in Ontario, as well as for other types of construction activity, was not accompanied by the quick movement of construction labour to Ontario from other provinces where construction activity remained depressed. Consequently, despite labour shortages in parts of Ontario, particularly in the Toronto area, the unemployment rate for the construction industry remained very high into 1987 in western and eastern Canada. (It would be useful to determine why the response was not more forceful.)

Finally, a government initiative could be to continue to examine the housing regulatory environment in its broadest sense, with the objective of eliminating unnecessary negative regulations and restructuring the environment so it is more conducive to new ideas, processes and products but does not neglect broad public policy concerns.

NOTES
WORKING PAPER FOUR

CHAPTER ONE

1. *The Concise Oxford Dictionary* (Oxford: Oxford University Press, 1982), p. 154.

2. Economic Council of Canada, *The Bottom Line* (Ottawa: ECC, 1983), p. 25.

3. *Ibid.*

4. Economic Council of Canada, *Innovation and Jobs in Canada* (Ottawa: ECC, 1987), pp. 6–8. Economists have concentrated largely on the relationship between traditional inputs, such as labour, materials and capital, and industry output rather than other factors, such as the structure of organizations and their decision-making methods.

5. Economic Council of Canada, *The Bottom Line*, p. 26.

6. Economic Council of Canada, *Innovation and Jobs in Canada*, p. 157.

7. *Ibid.*

8. Economic Council of Canada, *The Bottom Line*, p. 27.

9. Peter Drucker, *Innovation and Entrepreneurship: Practice and Principles* (New York: Harper and Row, 1985), and Peter Drucker, "The Discipline of Innovation," *Harvard Business Review*, May–June 1985, pp. 67–72.

10. Economic Council of Canada, *The Bottom Line*, p. 28.

11. Ibid., p. 29.

12. *Ibid.*, pp. 59–61.

13. *Ibid.*, pp. 40–45.

14. *Ibid.*, p. 31.

15. *Ibid.*, p. 33.

CHAPTER THREE

1. This chapter was written by Scanada Consultants Limited with technical input from A.T. Hansen, a former employee with the National Research Council's Division of Building Research.

CHAPTER FOUR

1. See *Working Paper Three*, p. 24.

2. The main limitation of Statistics Canada's residential general contractors data are that not all single-family builders are included (excluded, for example, are land developers and rental apartment developers, who also build single-family homes). But they do include an unknown number of smaller renovation firms. Consistent data are available from 1981. The Ontario New Home Warranty Program data include all builders of homes for the ownership market (not just single-family builders).

3. See *Working Paper One*, p. 30.

4. Ministère de l'Habitation et de la Protection du consommateur, *Housing for Quebecers*, 1985, p. 27.

5. See *Working Paper One*, p. 29.

6. Langlais, Hurtubise et Associés, *Quebec House Builders Study: Summary*, September 1984, pp. 20–24.

7. Canadian Home Builders' Association, *Survey of Economic and Housing Market Conditions*, June 1983, p. 3.

8. Lynda H. Newman, *Structural Change in the Housing Industry* (Winnipeg: Institute of Urban Studies, University of Winnipeg, 1984), p. A–8.

9. Cliff Bowman, "Pry Open the First-Time Buyer Market With Creative Financing," *Canadian Building*, March 1982, pp. 26–27.

10. Langlais, Hurtubise et Associés, *op. cit.*, p. 13.

11. *Ibid.*, p. 24.

12. See *Working Paper Three*, p. 5.

13. Canadian Home Builders' Association, *A Proposal for Spurring the Production of New Ownership Housing in Canada*, a submission to the federal Minister Responsible for Housing, May 1982, p. 7.

14. See *Working Paper Three*, p. 24.

15. See *Working Paper One*, p. 31.

16. Canadian Home Builders' Association Manufacturers' Council, *Building Materials Report*, February 8, 1987.

17. Bank of Canada, *Bank of Canada Review*, September 1987, p. 13.

18. *Ibid.*, p. 16.